

# RESEARCH ON THE RESISTANCE FACTORS OF BICYCLE SPORTS IN WIND CAVE

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**KEY WORDS:** air resistance, posture angle, act on, wind velocity

**INTRODUCTION:** The purpose of this study is to test the effect of air resistance on the cyclist in position behind the leading competitor, experimenting with different distances or wind velocities. From this research, the effect of change in resistance on the athlete in various postures can be determined. Relevant information can also be obtained on the changing tendency of air resistance in some basic postures. In this way it is possible to provide more scientific data for training and competition.

**METHODS:** To obtain the data for this study, the total wind resistance constituted by the athletes and their bicycles was measured with same equipment. Beijing Air Force Academy provided the FD—09 closed low velocity wind cave. The section shape of the cave was a 3 meters long side square. The four angles of the square were circled. The length of the cave was 12 meters long. Six wind velocities were selected for analysis. They are 8m/s, 11m/s, 14m/s, 16m/s, 18m/s and 20m/s. For accuracy, tower and mechanical scales were used. The athletes and their bicycles were fixed on the scales. The wheels of bicycles were placed 0.1 meters away from the cave wall. The angle of the wind blowing from the profile was controlled by  $\beta$  turntable system. The ruler and quadrant measured the posture angle  $\alpha$ . This was considered accurate to  $0.1^\circ$ . Measurement of the angle of elbow joint  $\beta$  was obtained with measuring instrument. This was accurate to  $0.1^\circ$ . Projection in front was adopted to measure the area of the athlete against the wind. The searchlight was placed 30 meters away from the projection board. The axe of the light is at the same level with the crossbeam of bicycle. The athlete and his bicycle are balanced at the axle.

**RESULTS:** The changing law of resistance can provide scientific data for cycling competition. If the athlete following behind can take advantage of the opportunity provided by the leading athlete, he will be successful in winning the race. The resistance acting on the following athlete can be reduced by 25% even when the two bicycles are 3.6 meters apart. The front athlete is still not free from the challenge of the following one. On the contrary, the following athlete can take advantage of the favorable situation. The greatest opportunity for success for the following one occurs when the distance between the two cyclists, ranges from 0.3 meter to 0.4 meter.

**DISCUSSION:** When the distance between cyclists is 0.1 meter, the following athlete, maintaining the same posture can gain the half of the air resistance. When the distance changes from 0.1 meter to 0.4 meter, the air resistance acting on the following athlete changes slowly. When two bicycles are 1.6metres apart, the resistance acting on the following athlete is 60% of that acting on him without disturbance. When the athletes are 3.6 meters apart, the percentage is 75%.

## REFERENCES:

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